

**FEASIBILITY STUDY OF INCREASING THE RATE OF
DIGESTION IN ANAEROBIC DIGESTERS**



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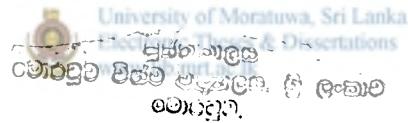
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FEASIBILITY STUDY OF INCREASING THE RATE OF DIGESTION IN ANAEROBIC DIGESTERS

by

J A A D Jayasuriya

This thesis was submitted to the Department of Civil Engineering of the University of Moratuwa, Sri Lanka, in partial fulfillment of the requirements for the degree of Master of Engineering in Environmental Engineering and Management



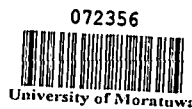
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ABSTRACT

The anaerobic digestion of vegetable garbage, is quite slow, with retention times of 80-100 days. Because of these slow rates of digestion, reaction vessels needed, are quite large. Research clearly needs to concentrate on increasing the rate of the process and decreasing the reactor volumes required, in commercial applications.

In this study a literature survey was carried out to find out the possible ways of increasing the rate of anaerobic digestion and later some laboratory work was carried out in order to verify some of the findings of the literature survey.

Literature survey showed that for the anaerobic digestion to be efficient the environment inside the reactor should be strictly anaerobic; the value of pH should be between 7 and 8; the feedstock should be biodegradable and should contain enough seed bacteria; the carbon to nitrogen ratio (C/N) of the feed should be between 20 and 30. Furthermore literature shows that anaerobic digestion can occur in three different temperature ranges due to the activity made by three different groups of bacteria. Cryophilic range is between 10°C and 20°C ; Mesophilic range is between 30°C to 40°C; and Thermophilic range is between 45°C and 60°C. According to the literature thermophilic bacteria are most efficient and they can digest vegetable garbage within a period of 10 days.

Laboratory experiments also confirmed that within the thermophilic range, if the other environmental parameters are fulfilled, a mixture of vegetable garbage is anaerobically digested in a period of 10 days. Laboratory experiments confirmed that application of enrichment culture also enhances the performance of anaerobic digesters.

TABLE OF CONTENTS

CHAPTER	TITLE	PAGE
	Title page	I
	Acknowledgement	II
	Abstract	III
	Table of contents	IV
	Notations	V
1.0	INTRODUCTION	1
	1.1 Statement of the problem	2
	1.2 Objective of the research	2
	1.3 Scope of the study	3
2.0	FINDINGS OF LITERATURE REVIEW	4
	2.1 Fundamentals of anaerobic digestion	4
	2.2 Possible methods that could be used to increase the rate of digestion	19
3.0	EXPERIMENTAL PROCEDURE & MATERIALS USED	22
	3.1 Methodology	25
4.0	RESULTS	29
	4.1 Lab scale experiments- trial 1	30
	4.2 Lab scale experiments- trial 2	32
5.0	DISCUSSION	40
6.0	CONCLUSION	43
7.0	Recommendations for further work	44
	References	45
	Bibliography	46
	Appendix	47

NOTATIONS

B.A. Buffering Agent

B.O.D. ~~Bio-Chemical~~ Oxygen Demand

C.D. Cow Dung

C/N Carbon to Nitrogen ratio

C.O.D. Chemical Oxygen Demand

E.C. Enrichment Culture

NaHCO₃ Sodium bi-carbonate

V.G. Vegetable Garbage

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